

## EDITORIAL

### RESPONSE OF AEOLIAN PROCESSES TO GLOBAL CLIMATE CHANGE

Aeolian processes are significant in arid regions worldwide and result from interactions between winds and the land surface. They are therefore sensitive to changes in both atmospheric parameters and surface conditions. Many climate models predict an aridification of continental interiors with even slight levels of greenhouse warming. Most continental interiors experience arid or semi-arid climates today and historical records show that their environments and economies are extremely sensitive to short-term climate change (e.g. Dust Bowl of the 1930s, Sahel droughts of the 1970s) (Muhs and Holliday 1995). This volume contains papers that were presented at a workshop on the response of aeolian processes to global change, held at the Desert Studies Center, Zzyzx, California, from 24 to 29 March, 1994. The papers in this volume emphasize the importance of both fundamental and applied studies to the understanding of the impact of environmental changes on aeolian processes.

Understanding of the response of aeolian processes to climatic change and human impacts requires knowledge of the conditions that determine the environmental thresholds for transport as well as those that influence the rate of transport of material of sand and dust size ranges. This involves studies of the mechanics of sediment transport and the effects of changes in surface parameters (e.g. crusting of soils, vegetation cover) on thresholds for transport. The effects of vegetation cover on transport thresholds are examined in wind tunnel studies by Musick and co-workers and field studies by Wolfe and Nicking. In many areas, material of dust (silt and clay) size is released by the impact of saltating sand grains on crusted soils and surfaces. These processes are examined in full-scale field experiments at Owens Lake by Cahill and co-workers. Interactions between surface characteristics and the wind result in an increase in sediment flux with distance downwind (the 'fetch effect') which is investigated in field experiments by Gillette *et al.*

In many areas, human activities have a strong influence on aeolian processes via agricultural practices, changes in land use, and effects on the hydrologic cycle. One result is dust emissions from dry lake beds at Owens Lake, California, as discussed by Cahill *et al.* There is a long history of studies of wind erosion of agricultural land that have made important contributions to the understanding of fundamental processes. These studies have, in turn, contributed to changes in agricultural practices that reduce soil erosion by wind. Papers by Leys and McTainsh and Stetler and Saxton show how tillage operations influence wind erosion of agricultural areas.

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#### REFERENCE

- Muhs, D. R. and Holliday, V. T. 1995. 'Active dune sand on the Great Plains in the 19th century: evidence from accounts of early explorers', *Quaternary Research*, **43**, 118–124.